AMENDMENTS TO THE CLAIMS

No claims have been canceled/amended herein.

The following listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims

Claims 1-42. (Canceled)

43. (Previously Presented) Method for ultrasound measurement of at least one of an opening surface area of a orifice through which a fluid flows, in particular blood, and of the volumetric flow rate and of the flow volume through the orifice,

with evaluation of the backscatter of a measurement beam having a spatial measurement area and of a reference beam having a spatial measurement area, wherein the spatial measurement area of the reference beam lies within the spatial measurement area of the measurement beam,

wherein several measurement beams with offset spatial, partially overlapping measurement areas covering the orifice completely and at least one of one reference beam and of several reference beams with offset spatial measurement areas are evaluated for determination of at least one of the opening surface area, the volumetric flow rate, the flow volume, and any value proportional thereto.

44. (Previously Presented) Method according to claim 43, wherein the orifice is at least one of dynamic and irregular.

45. (Previously Presented) Method according to claim 43, wherein a central measurement area of a measurement beam is surrounded in a rosette pattern by several measurement areas of further measurement beams.

46. (Previously Presented) Method according to claim 43, wherein, for each measurement beam, a reference beam is evaluated whose measurement area lies inside the measurement area of the associated measurement beam.

47. (Previously Presented) Method according to claim 43, wherein the several measurement beams are evaluated cumulatively, with overlaps of their measurement areas being compensated, in order to generate a power profile which is as homogeneous as possible across the entire area.

48. (Previously Presented) Method according to claim 43, wherein the measurement area of a central reference beam is surrounded in a rosette formation by several measurement areas of further reference beams.

49. (Previously Presented) Method according to claim 43, wherein the measurement area of a reference beam is directed into the inside of a vena contracta of the fluid flow through the orifice.

50. (Previously Presented) Method according to claim 43, wherein one reference beam forms a reference value for all the several measurement beams.

51. (Previously Presented) Method according to claim 43, wherein the reference values of several reference beams are continuously determined and the position of the measurement areas is corrected as a function of the reference values during a measurement period, so that the measurement area of a central reference beam remains within a vena contracta of the fluid flow through the orifice.

52. (Previously Presented) Method according to claim 43, wherein the reference values of several reference beams are continuously evaluated during a measurement period, and the measurement areas of the reference beams and of the measurement beams are shifted during a measurement period when the reference value of the central reference beam reaches or drops below a reference value of another reference beam into the direction from the central measurement area to the measurement area of the last-mentioned reference beam.

53. (Previously Presented) Method according to claim 43, wherein power spectra of Doppler signals of the backscattered measurement beams and the at least one reference beam are evaluated as backscatter to determine at least one of the opening surface area, the volumetric flow rate, the flow volume and the value proportional thereto.

54. (Previously Presented) Method according to claim 43, wherein pulsed ultrasound Doppler signals are used.

55. (Previously Presented) Method according to claim 43, wherein a transmit beam is generated by means of a matrix array transducer and directed to desired measurement areas.

56. (Previously Presented) Method according to claim 43, wherein the several measurement beams and the at least one reference beam are detected by means of a matrix array transducer as a function of the measurement areas.

57. (Previously Presented) Method according to claim 43, wherein during a measurement period, at least one of the opening surface area, the volumetric flow rate, the flow volume and the value proportional thereto is determined separately for two or more separate orifices.

58. (Previously Presented) Method according to claim 43, wherein at least one of the opening surface area, the volumetric flow rate, the flow volume and the value proportional thereto is displayed.

59. (Previously Presented) Method according to claim 43, wherein the measurement area of the measurement beam is moved free-dimensionally beforehand in a search mode, while Doppler signals are continuously detected and evaluated in respect of the occurrence of a Doppel spectrum characteristic of a vena contracta, so that thereafter for the determination, the measurement area of the reference beam is directed into the inside of the vena contracta of the fluid flow through the orifice and the measurement area of the measurement beam is directed into the area of the vena contracta of the fluid flow through the orifice.

60. (Previously Presented) Method according to claim 59, wherein, in order to detect a vena contracta, at least one of the following conditions are evaluated:

whether the mean speed of the floor determined by means of the Doppler signals exceeds a minimum value or is maximal;

whether the width of the speed spectrum of the floor determined by means of the Doppler signals falls below a maximum value;

whether the power or the power integral over the speed of the floor determined by means of the Doppler signals exceeds a minimum value or is maximal;

whether the Doppler spectrum shows an at least substantially continuous or constant line of maximal speed; and

whether the speed spectrum of the floor determined by means of the Doppler signals at a given time and at maximum speed shows at least one of a substantially Gaussian distribution or normal distribution.

61. (Previously Presented) Device for ultrasound measurement of at least one of an opening surface area of a dynamic or irregular orifice through which a fluid flows, in particular blood, of the volumetric flow rate and of the flow volume through the orifice,

with means for evaluation of the power spectrum of Doppler signals of a measurement beam having a spatial measurement area and of a reference beam having a spatial measurement area, wherein the spatial measurement area of the reference beam lies within the spatial measurement area of the measurement beam,

wherein the device has a matrix array transducer for generating a transmit beam and for detecting the measurement beam and reference beam, and is adapted such that several measurement beams with offset spatial, partially overlapping measurement areas covering the orifice completely and at least one of one measurement beam and of several reference beams with offset spatial measurement areas can be detected and evaluated for determination at least one of the opening surface area, the volumetric flow rate, the flow volume and any value dependent thereon.

62. (Previously Presented) Method for ultrasound measurement of the opening surface area of a dynamic or irregular orifice through which a fluid flows, in particular blood, and/or of the

volumetric flow rate and/or flow volume through the orifice, with evaluation of the backscatter of a measurement beam having a spatial measurement area and of a reference beam having a spatial measurement area, wherein the spatial measurement area of the reference beam lies within the spatial measurement area of the measurement beam,

wherein the measurement area of the measurement beam is moved three-dimensionally beforehand in a search mode, while Doppler signals are continuously detected and are evaluated in respect of the occurrence of a Doppler spectrum characteristic of a vena contracta, so that thereafter, for determination of at least one of the opening surface area, the volumetric flow rate, the flow volume and any value proportional thereto, the measurement area of the reference beam is directed into the inside of the vena contracta of the fluid flow through the orifice and the measurement area of the measurement beam is directed into the area of the vena contracta of the fluid flow through the orifice.

63. (Previously Presented) Method according to claim 62, wherein, in order to detect the vena contracta, at least one of the following conditions are evaluated:

whether the mean speed of the floor determine by means of the Doppler signals exceeds a minimum value or is maximal;

whether the width of the speed spectrum of the floor determine by means of the Doppler signals falls below a maximum value;

whether the power or the power integral over the speed of the floor determine by means of the Doppler signals exceeds a minimum value or is maximal;

whether the Doppler spectrum of the floor determine by means of the Doppler signals shows an at least substantially continuous or constant line of maximal speed; and

whether the speed spectrum at a given time and at maximum speed shows at least one of a substantially Gaussian distribution or normal distribution.

64. (Previously Presented) Method according to claim 62, wherein a three-dimensional data set with the information of the spatial distribution of velocity and volume flow is obtained in the search mode and stored so that this data set can be used later to determine at least one of the occurrence of a vena contracta, the opening surface area, the volumetric flow rate, the flow volume and a value dependent thereon.